

Design and Application Innovation of Central Control System in Smart Exhibition Hall

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ABSTRACT

The central control system of the smart exhibition hall is a set of intelligent system that receives the communication data of the equipment by a service terminal system, feeds back and processes the data, and presents the state of all the equipment. It is the integrated application of mobile Internet, Internet of Things, information technology, data-driven technology and other technologies. It is the integrated application of mobile Internet, Internet of Things, information technology, data-driven technology and other technologies. The design of the central control system of the smart exhibition hall includes the design of equipment control and media information control of the exhibition hall. The application value of the data obtained from the central control system of the smart exhibition hall is huge, which includes equipment control based on real-time passenger flow data, audience trend analysis based on passenger flow data, content analysis based on operation data, energy consumption analysis based on operation data, and emergency plan optimization based on operation data, etc.

Keywords: *Wisdom Hall, Central control system, Design innovation, Application of innovation*

1. INTRODUCTION

The smart exhibition hall central control system is an intelligent control system for centralized management and control of all exhibition items in the exhibition hall. The central control system of the smart exhibition hall mainly relies on mobile Internet, Internet of Things, information technology, and data-driven technologies. It controls various exhibition items in the exhibition hall through PC, tablet, mobile phone and other smart devices, and realizes the management and control of the exhibition hall. The data analysis of the central control system provides more accurate analysis for the exhibition hall.

2. TECHNICAL INTEGRATION OF THE CENTRAL CONTROL SYSTEM OF THE SMART EXHIBITION HALL

At present, the exhibition hall control procedures are becoming more complicated and people's needs are diversified, so it is necessary to combine more advanced equipment and systems. The central control system of the smart exhibition hall is to make the display more intelligence, wisdom and modernization. Combining contemporary science and technology, through mobile Internet, Internet of Things, data-driven, information technology, etc. , the centralized control and management of the entire exhibition is realized[1].

2.1. Mobile Internet

The combination of mobile communication and the Internet has created the mobile Internet. Mobile Internet not only has the characteristics of mobile, but also has the resource advantages of the Internet, enabling open sharing and interaction anytime, anywhere, and anywhere. Users use wireless terminal devices while on the move to access the Internet anytime and anywhere to obtain network services.

With the rapid development of modern mobile Internet technology and various applications provided by Internet companies, they provide technical support for the smart exhibition hall central control system, which greatly facilitates the management and control of the exhibition hall by users, and enables users to use mobile terminals in fixed areas carry out operation, greatly improve operation efficiency, save manpower and power resources.

2.2. Internet of Things

As an information carrier, the Internet of Things enables ordinary physical objects that can be independently searched to form an interconnected network based on the Internet and traditional telecommunications networks and various other possible network interfaces. And on this basis, it connects things and things, things and people, and realizes intelligent perception, recognition and management based on things and processes.

The central control system of the smart exhibition hall also combines the radio frequency identification technology and infrared sensor device in the Internet of Things technology. When the audience arrives at the designated area, it starts the screening of the media tools; it automatically enters the dormant state when there is no audience, paying attention to the audience's a sense of experience and enhance audience satisfaction with the exhibition hall.

2.3. Information Technology

Information technology, also called information and communication technology, is a technology used to obtain, store, transmit, process, analyse, and standardize information. Information technology is mainly through the application of computer science and communication technology to design, develop, install, and implement information systems and application software, while processing, transmitting and utilizing a series of technologies [2].

Modern information technology is widely used in exhibitions. In the early stage of exhibitions, it is mainly used for information release and publicity. During exhibitions, it is necessary to use information technology to display products or services, combined with smart exhibition hall central control systems and multimedia technology equipment to display products, Promote the corporate culture, achieve the goal of attracting audiences, and in the visit mode, the audience can perform autonomous operations on the touch screen to obtain the required information and save resources.

2.4. Data-driven Technology

Data-driven updates the platform architecture and is a brand-new model based on big data. Data-driven needs to make good use of big data, collect all-round data, including exhibitions, passenger flow, environment, equipment, etc., and accurately analyse and process them. Deeply dig into the value behind the data, so as to provide accurate prediction and analysis for all aspects of the exhibition hall, so that the exhibition hall can gradually improve services and management. In the smart exhibition hall central control system, data-driven technology can collect and analyse the number of visitors in each time period of the exhibition hall to automatically switch the modes in the exhibition hall and the environment in the exhibition hall to improve user experience.

3. ARCHITECTURE DESIGN OF CENTRAL CONTROL SYSTEM IN THE SMART EXHIBITION HALL

3.1. System architecture ideas

The central control system of the smart exhibition hall is a set of intelligent systems in which a service terminal system receives the communication data of the equipment, and feeds back and processes the data, and presents the status of all equipment[3].The network cables, routers, switches, and hosts are connected to each other to form a small and medium-sized local area network, and the hardware interfaces and software communication protocols are common standards, so the central control architecture of the exhibition hall has the core. And most of the interactive screens and projectors on the market currently have their own network interface, which matches the communication protocol, and can control their startup and shutdown, cooling and preheating feedback in real time, and can also perform troubleshooting. The central control system of the smart exhibition hall needs to be based on the nature and functions of the exhibition itself, combined with various multimedia equipment, including various sound controls, lighting devices, sand table interaction, and can be connected to the communication interfaces of various infrared transmission products, as well as computers, Projector, playback terminal and other equipment.

3.2. System structure analysis

The central control system of the smart exhibition hall is a representative application mode of the Internet of Things technology. It is a comprehensive system that integrates new technologies and methods. The internal structure of the central control system of the smart exhibition hall is summarized into the perception layer, the network layer and the network layer. The perception layer is composed of various sensors and various execution components. It mainly develops control equipment and intelligent collection of information content, and properly handles the difficult problems of data acquisition. It is the core layer of the intelligent control system. The network layer is also the transmission layer, which is the medium for exchanging information and transferring data. Its main function is access and transmission. It can not only transmit over long distances, but also achieve close access to the underlying network. The application layer is the processing layer, which performs information processing and solves the faults of the man-machine interface. Because the application layer directly faces the user, it sorts, analyse, and processes the data transmitted by the network layer, and interacts with people with the help of devices, so this layer is the key to achieving intelligence[4].

3.3. System performance analysis

The smart exhibition hall central control system based on the wireless network technology platform has stable performance, is not restricted by physical distance, and is not restricted by manufacturers. It is convenient for exhibition introducers to control and display different exhibition items during the movement. The system uses Transmission Control Protocol and Internet Protocol, and supports operation terminal control via LAN or Internet. Simple operation and use, one key to open all equipment, multimedia equipment, including projection, LED large screen, DLP rear projection large screen, LCD splicing screen, etc. , cameras, lighting devices, window curtains, stage curtains, ambient temperature and humidity, various strengths Electric switches, security alarm devices, access control fingerprint and face recognition attendance, video surveillance systems, etc. In the control interface, exhibition customers can categorize according to their own exhibition area and type, personalized custom menu, flexible customization, free from complicated procedures, and fully automated processing [5].

4. DESIGN AND CONTROL OF CENTRAL CONTROL SYSTEM IN THE SMART EXHIBITION HALL

4.1. Equipment control design of smart exhibition hall

The design of the central control system of the smart exhibition hall includes the design of exhibition hall equipment control and the design of media information control. These two parts are the relationship between technology and content, and complement each other to form an organic and complete system.

The design of the central control system of the smart exhibition hall is mainly the design of the equipment control of the exhibition hall. The exhibition hall equipment is fully controlled by the tablet terminal, and the corresponding instructions are sent to the central control computer. At the same time, the system also needs to design the control interface. The control interface adopts a simple and elegant design to control the exhibition items in the exhibition hall. Control the opening and closing of all lights in the exhibition hall, as well as the adjustment of light intensity; control the opening and closing of TV, projection, LCD screen, and touch screen; control the opening and closing of curtains and curtains; control the opening and closing of glass doors and physical light boxes Turn off; control the pause and turn off of the movie on the TV screen, etc.

The control system of the smart exhibition hall also includes the design of media information control. In the current exhibition hall, there are often multiple devices playing media at the same time. In order to facilitate and efficient management, the central control system is usually

used to control the media. Through the mobile phone or tablet computer, visit the Internet page of the central control server, through the central control server, send instructions to the exclusive media player computer, you can select and play media, pause and close. In addition, two modes can be selected on the central control system, namely the leader mode and the visit mode. If in the leadership mode, the person in charge of the explanation in the exhibition hall will manually control the system, and play and pause according to the progress of the explanation. In the visit mode, the audience is allowed to control the media, but a touch screen device needs to be installed on site. If the device is missing, you can use the human body detection device to automatically play the media of the device when someone approaches and stop, and when it senses that the crowd gathers, it automatically adjusts the lights and dims the lights to let people focus on the playback screen .

4.2. The composition of the smart exhibition hall equipment control system

Commonly used equipment in the exhibition hall includes computers, TVs, serial devices, cameras, etc. The equipment in the exhibition hall is fully controlled by the tablet computer terminal, and the corresponding instructions are sent to the central control computer. The tablet computer interface is clear and easy to understand, the structure is simple and clear, and the operation is easy.

5. DATA APPLICATION INNOVATION OF THE CENTRAL CONTROL SYSTEM OF THE SMART EXHIBITION HALL

Based on technology and knowledge, the data-driven system collects and manages data in an all-round way, analyse data similar to the brain, and uses scene-combining technology to control the exhibition hall and audience dynamics in real time, better improve exhibition hall services, and realize exhibitors' display aims.

5.1. Equipment control based on real-time passenger flow data

If there is no audience in the exhibition hall or less than the planned number of passengers, the multimedia lighting and other multimedia equipment will automatically be in a dormant state. When the number of viewers reaches the set value, it will switch from the sleep state to the active state. When the number of visitors exceeds the set value and reaches a higher number, the system will automatically adjust the environmental indicators in the exhibition hall, such as temperature and humidity, so that people are in a suitable environment.

5.2. Trend analysis based on passenger flow data

The passenger flow count is not a simple number of people, but includes the number of people in each exhibition area at each time period, the length of time the audience stays in each zone, each booth, audience portraits, determination of new and old customers, and product preferences of the audience. After accumulating certain audience, lighting, equipment, environment and other data, it can analyze the audience's number, preferences and behavior patterns, automatically switch scenes and other modes, thereby optimizing the exhibition hall, optimizing resource allocation and predicting development trends, and increasing audiences Likes[6].

5.3. Content analysis based on operating data

Regarding the power-on, power-off and sleep settings of the playback device, it can be set according to the frequency of data operation. According to the trend analysis of passenger flow data, the control is divided into time and area, the most popular playback interface of the audience is played at a special time at a specific time, the running time of the exhibition items is reasonably arranged, and the maximum operating efficiency of the equipment is maximized to achieve true satisfaction. The audience needs to carry out accurate content push to achieve the purpose of transaction.

5.4. Energy consumption analysis based on operating data

Monitor the running status of the exhibition item, understand the service life of the equipment, and the actual start and stop time of the exhibition item and equipment, and analyze the energy consumption based on the data in time, which can maximize the efficiency of the equipment and extend the service life of the equipment. While improving the viewer's perception and experience, it can also protect equipment, save energy and reduce emissions.

5.5. Emergency plan based on operating data

Summarize the time period and partition of the large passenger flow through the data, prepare in advance the plan and risk management of emergency measures such as large passenger flow and power outages, and provide data support for the optimization of the intelligent control of the exhibition hall.

6. CONCLUSION

Based on the control of the wireless network, the central control system of the smart exhibition hall is not restricted

by physical distance, so that visitors can also control and display different exhibition items in the exhibition hall while they are moving; and can be controlled by a tablet computer. Through the control button, the device can be switched on and off, as well as the volume, lighting, etc. adjustment.

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REFERENCES

- [1] MouQichun, MouQizhi. A central control system for exhibition halls[J]. Computer Programming Skills and Maintenance, 2018(12), pp. 4-5.
- [2] Li Xiaodan. Thoughts on the construction of an intelligent central control system for museum exhibitions based on data-driven [J]. Information and Computer (Theory Edition), 2018(12), pp. 127-129.
- [3] Yan Ping, Zhang Xinggan, Bai Yechao, et al. Smart home system based on Internet of Things technology [J]. Journal of Nanjing University: Natural Science Edition, 2012(01): 26-32.
- [4] You Hai, Yang Tao, Liu Feng, et al. Scene-based intelligent central control system[J]. China Science and Technology, 2011(02), pp. 16-17.
- [5] Yang Gang, Zhang Hui, Yao Yuan, Shi Ming. Research on the Application of 3D Gesture Technology in Energy-saving Showroom [C]. China Electric Power Research Institute. Proceedings of 2017 Smart Grid Information Construction Seminar. China Electric Power Research Academy: The Sixth Research Institute of China Electronics Information Industry Group Co. , Ltd. , 2017, pp. 176-181.
- [6] Wang Bin. Research on the key technologies and application prospects of the Internet of Things [J]. Information and Computers (Theoretical Edition) (Phase 2), 2011, pp. 88-88.